A.D. 1866, 9th May. N° 1325.

Cutting, Rolling, and Shearing Metal Bars or Beams.

LETTERS PATENT to James Fletcher, of the Firm of Messieurs William Collier and Company, of Salford, in the County of Lancaster, Engineers and Tool Makers, for the Invention of "IMPROVEMENTS IN MACHINES FOR CUTTING, ROLLING, AND SHEARING BARS OR BEAMS OF METAL FOR MAKING RIVETS, AND FOR OTHER PURPOSES."

Sealed the 24th October 1866, and dated the 9th May 1866.

PROVISIONAL SPECIFICATION left by the said James Fletcher at the Office of the Commissioners of Patents, with his Petition, on the 9th May 1866.

I, JAMES FLETCHER, of the Firm of Messieurs William Collier and Company, of Salford, in the County of Lancaster, Engineers and Tool Makers, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN MACHINES FOR CUTTING, ROLLING, AND SHEARING BARS OR BEAMS OF METAL FOR MAKING RIVETS, AND FOR OTHER PURPOSES," to be as follows:—

The first part of my Invention is particularly applicable in making rivets or other round articles with heads or shoulders, and it consists in an improved combination of rollers, one or more of which is or are provided with a cutting disc for cutting off a portion of the bar of metal to be rolled, and for rolling it to the proper diameter and with the requisite head or shoulders. In performing my Invention I employ two rollers working in fixed bearings, and one or two rollers mounted in a slide or slides or in a swivel arm; the bar of metal to be rolled when heated is pushed in between the two rollers in fixed

bearings and the moveable roller, which is then forced forward ; by this means the cutting disc severs the required length of the bar, and the rollers compress and reduce it to the proper diameter ; the head or shoulders are produced by the shape of the disc or by grooves in the rollers. When two moveable rollers are employed they act alternately, thus economising time and labor.

The second part of my Invention is particularly applicable for cutting or shearing T iron or steel bars, but it may be employed in cutting bars or beams of other sections having two or more ribs or flanges. In performing my Invention I affix two or more cutters to a disc or plate, and these cutters are set so as to act on two or more flanges or surfaces of the bar or beam to be cut. The requisite motion is given to the disc or plate by an eccentric or other equivalent, and when the disc or plate is moved the cutters act simultaneously on both or all the flanges or ribs of the bar or beam to be cut. By this arrangement the bar or beam is cut when cold without distorting either the bar or beam or the piece cut off, thereby economising the labor now generally required for cutting such bars or beams by heating them and then cutting them by hand.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said James Fletcher in the Great Seal Patent Office on the 8th November 1866.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, JAMES FLETCHER, of the Firm of Messieurs William Collier and Company, of Salford, in the County of Lancaster, Engineers and Tool Makers, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Ninth day of May, in the year of our Lord One thousand eight hundred and sixty-six, in the twenty-ninth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said James Fletcher, Her special license that I, the said James Fletcher, my executors, administrators, and assigns, or such others as I, the said James Fletcher, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "IMPROVEMENTS IN MACHINES FOR CUTTING, ROLLING, AND SHEARING BARS OR BEAMS OF METAL FOR MAKING RIVETS, AND FOR OTHER PURPOSES," upon the condition (amongst others)

that I, the said James Fletcher, my executors or administrators, by an instrument in writing under my, or their, or one of their hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that I, the said James Fletcher, do hereby declare the nature of my said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement, that is to say:—

The first part of my Invention is particularly applicable in making rivets or other round articles with heads or shoulders, and it consists in an improved combination of rollers, one or more of which is or are provided with a cutting disc for cutting off a portion of the bar of metal to be rolled, and for rolling it to the proper diameter and with the requisite head or shoulders. In performing my Invention I employ two rollers working in fixed bearings, and one or two rollers mounted in a slide or slides or in a swivel arm; the bar of metal to be rolled when heated is pushed in between the two rollers in fixed bearings and the moveable roller, which is then forced forward; by this means the cutting disc severs the required length of the bar, and the rollers compress and reduce it to the proper diameter; the head or shoulders are produced by the shape of the disc or by grooves in the rollers. When two moveable rollers are employed they act alternately, thus economising time and labor.

The second part of my Invention is particularly applicable for cutting or shearing ⊤ iron or steel bars, but it may be employed in cutting bars or beams of other sections having two or more ribs or flanges. In performing my Invention I affix two or more cutters to a disc or plate, and these cutters are set so as to act on two or more flanges or surfaces of the bar or beam to be cut. The requisite motion is given to the disc or plate by an eccentric or other equivalent, and when the disc or plate is moved the cutters act simultaneously on both or all the flanges or ribs of the bar or beam to be cut. By this arrangement the bar or beam is cut when cold without distorting either the bar or beam, or the piece cut off, thereby economising the labor now generally required for cutting such bars or beams by heating them and then cutting them by hand.

And in order that my Invention may be fully understood and readily carried into effect, I will proceed to describe the two accompanying Sheets of Drawings, reference being had to the figures and letters marked thereon.

On Sheet 1, Figure 1 is a side view, and Figure 2 an end view of my

improved machinery for cutting and rolling bars of metal suitable for making rivets; Figures 3 and 4 are detached views of the compressing and cutting rollers *a* and *b*, which revolve in stationary bearings fixed to the framing of the machine; the circumferences of these rollers are close together without touching, as shewn in Figure 3, and they revolve in contrary directions at that part of their circumferences which are nearest each other, as shewn by the arrows. The roller *a* is driven by the pulley a^1 fixed to the end of the axle of the roller *a*, and the roller *b* is driven from the roller *a* by the pinion a^2 gearing into a broad carrier, which also gears into the pinion b^1 on the axle of the roller *b*. At the end of the roller *a* is forged or fixed the cutting disc a^3, shewn best in Figure 4, and at the end of the roller *b* is the disc b^3; the outer circumference of these discs are sharp and act as a cutter, while the smaller diameter of the disc a^3 is rounded to shape the head of the rivets. The rollers *c* and *d* revolve in the loose head stocks c^1 and d^1, which are fixed on the plate *e*, which slides to and fro on the plate e^1, forming part of the framing of the machine; the distance between the rollers *c* and *d* can be regulated by bolts and set screws. The plate *e*, with the head stocks c^1 and d^1 and the rollers *c* and *d*, are moved slowly to and fro by the worm a^4 on the axle of the roller *a*; the worm a^4 gears into the wheel f^1 fixed to the shaft *f*, to which is also fixed the mitre wheel f^2 gearing into the wheel g^2 on the side shaft *g*, to which is forged or keyed the crank or eccentric g^1, working in a slot in the bracket e^2 projecting from the plate *e*.

The mode of operation is as follows:—The bar of metal, marked *x*, to be converted into rivets or other articles when heated is pushed into the space between the rollers *a*, *b*, and *c*, the latter roller when the end of the bar is inserted being at its greatest distance from the rollers *a* and *b*; the end of the heated bar comes against the end of the regulating stop pin *i*, which is screwed through the bearing of the rollers *a* and *b*, and is provided with a lock, as shewn in Figure 1; the positoin of this stop pin can be adjusted according to the length of the rivet or other article under operation. As soon as the end of the bar is in its place the eccentric g^1 in revolving causes the roller *c* to approach the rollers *a* and *b*, and the discs a^3 and b^2 shear off the end of the bar, as shewn in Figure 4, in proportion as the roller *c* approaches the rollers *a* and *b*; the head of the rivet is formed by the smaller diameter of the disc a^3, and by the time the roller *c* has advanced to its determined distance from the rollers *a* and *b* the body or shank of the rivet and the head has been rolled to their proper diameters and shape. While the rivet or other article is being made between the rollers *a*, *b*, and *c*, as above described, the roller *d* is at its greatest distance from the rollers *a* and *b*, ready to receive the end of the bar

for making another rivet during the time that the roller c is moving from the rollers a and b, and the rivet previously made is being removed from the machine. The two rollers c and d thus act alternately, thereby economising time and labor. I wish to observe that bolts and studs or other articles with shoulders or of different diameters may be produced in a similar machine by making the rollers with suitable grooves and projections. It is also evident that the machine may be made with only one moveable roller instead of two, as shewn, and that the moveable roller or rollers may be mounted in a single or double swivel lever instead of in slides.

Figures 5 and 6 are two views of a portable machine which may be worked either by hand or power for cutting or shearing bars or beams of metal constructed according to my improvements.

The Drawing represents a method of working the cutters by means of a worm and segment, but the same may be effected by hydraulic or any other power. j is the truck or framing supported on the wheels k, k. The driving shaft l is supported in bearings in the framing, and to it is fixed the hand fly wheel l^1 and the fast clutch box l^2; the sliding clutch box l^3 is connected to the shaft l by a feathered key, and is moved to and fro by the handle m^1. To the shaft l is also fixed the worm l^4, which gears into the toothed segment n^1 fixed or cast to the drum n, which works in a socket in the framing. The end of the drum n forms a disc n^2, to which the three cutters n^3 are secured, and corresponding cutters o^1 are fixed to the plate o, which is bolted to the framing of the machine. In the plate o and disc n^2 are rectangular slots to admit the T-shaped or other shaped bar or beam to be cut. When the fly wheel l^1 is turned round and the clutch box l^3 is in gear with l^2, the segment n^1 moves the drum n partly round in the direction of the arrows in Figure 5; the cutters n^3 then acting partly above and partly below the top rib of the T iron and along the middle rib, as shewn full size in Figure 10 of Sheet 2, shear through the said ribs; the portion of metal at the junction of the ribs, as shewn by a star in Figure 10, being twisted off by the action of the cutters.

On Sheet 2, Figure 7 is an elevation of an ordinary compound machine for shearing and punching to which a modification of my improvements in cutting or shearing is applied, and as mentioned in the Provisional Specification accompanying the petition for these Letters Patent hydraulic or other power may be used, instead of the method shown on the Drawing. In this machine the cutters n^3 are fixed to the lever p, which is cast or fixed to the shaft p^1 working in a socket or bearing in the framing. The lever p is made to oscillate on its fulcrum by the crank q and connecting link q^1; and to the

lever p are fixed the two cutters n^3, one of which is broad enough to cut the whole of the top rib of the T-shaped bar to be cut, and the other is adapted to cut the middle rib, as shewn in Figure 5. The stationary cutters o^1 are fixed to the plate o. When the machine is in operation the descent of the lever p causes the cutters n^3 to shear simultaneously through both ribs of the T bar, as shewn by the dotted lines in Figure 9.

In Figure 8 I have shewn another ordinary shearing and punching machine to which my improvements are applied; in this instance the lever p is shewn double, one end being provided with cutters for shearing a T-shaped bar, as shewn in Figures 7 and 9, and the other end having a cutter for shearing angle bars.

Figure 11 represents a section of a metal bar with three ribs radiating from a centre, and Figure 12 represents a section of a metal bar with four radiating ribs; these bars may be sheared in a machine with cutters fixed to a disc, as shewn in Figures 5 and 6, and the cutters may be arranged to shear double T bars or beams of various other sections, and the action of the cutters being simultaneous on all the ribs or flanges of the bar or beam produces a clean cut without distorting the metal, which may be sheared cold, whereas it has heretofore been customary in cutting such bars or beams to heat them and then cut them by hand.

Having thus stated the nature of my Invention, and described several modes of carrying the same into operation, I declare that I claim the improved machinery shewn and described in reference to Figures 1, 2, 3, and 4 for cutting and rolling metal.

And, secondly, I claim the improved machinery shewn and described in reference to Figures 5, 6, 7, 8, 9, 10, 11, and 12 for cutting or shearing bars or beams of metal.

In witness whereof, I, the said James Fletcher, have hereunto set my hand and seal, this Fifth day of November, One thousand eight hundred and sixty-six.

JAMES FLETCHER. (L.S.)

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A. D. 1866. May 9. N° 1325.
FLETCHER'S Specification.

FIG. 6.

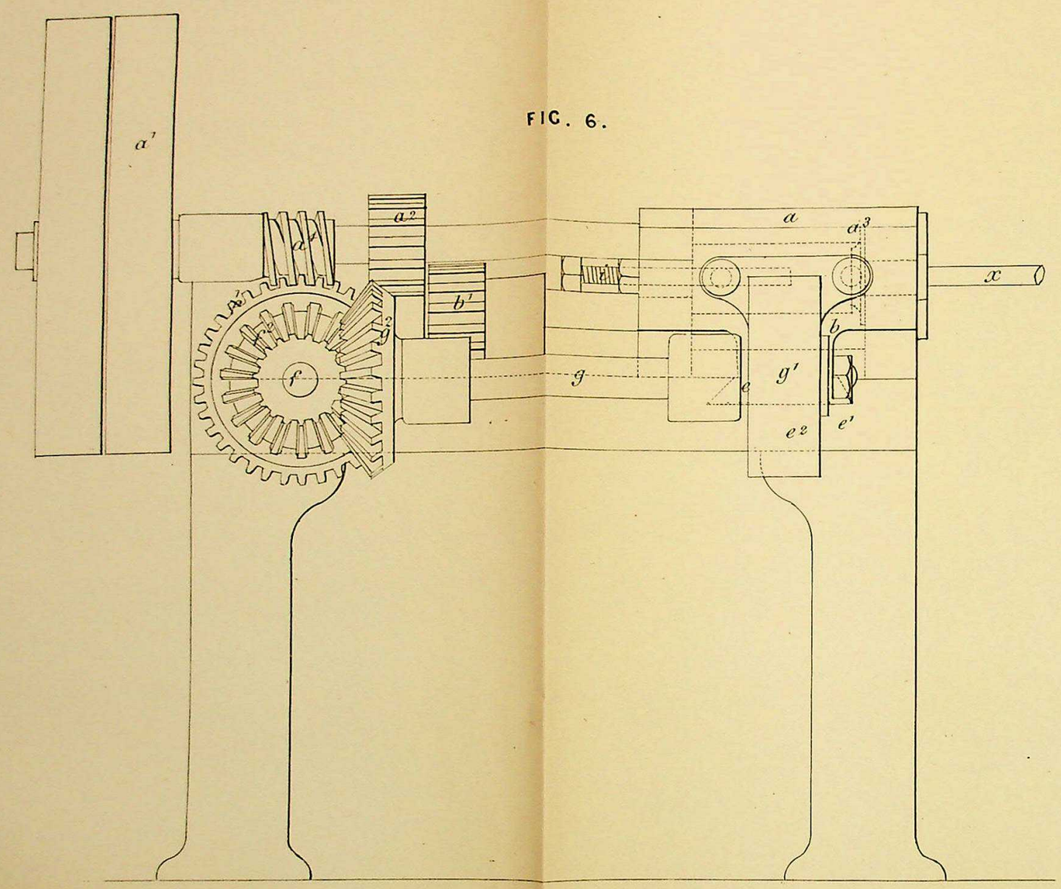
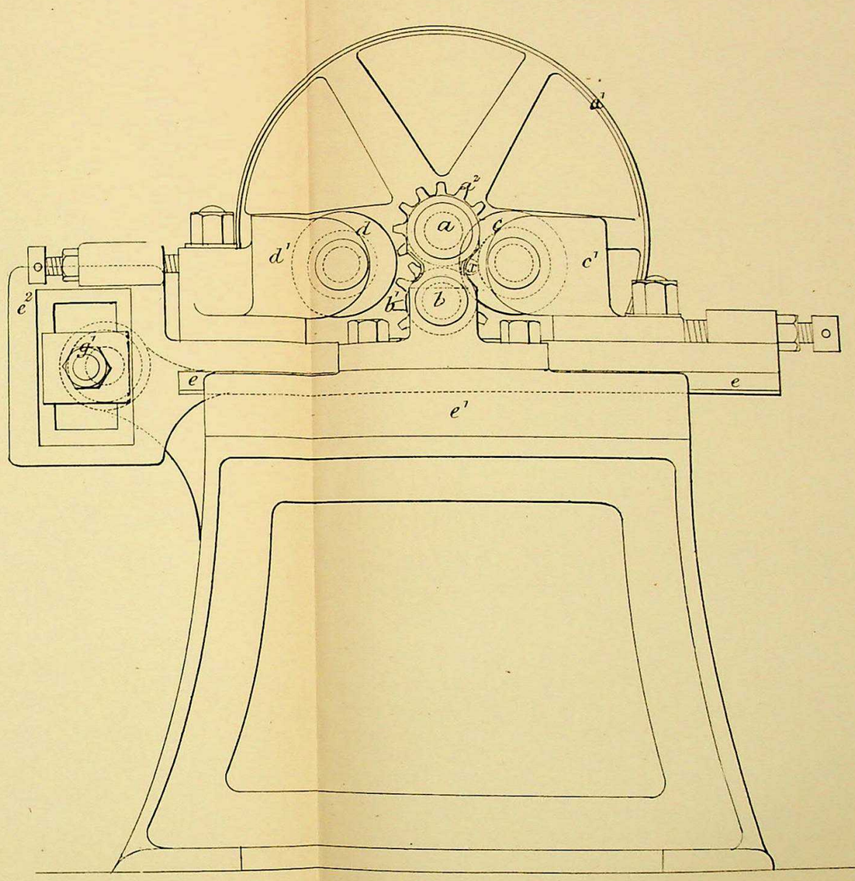


FIG. 2.



Scale for figs: 1, 2, 5 & 6 — 1½ inch to 1 foot
" " " 7 & 8 — 1 inch " " "
Figs. 3, 4, 9, 10, 11 & 12. Full size.

FIG. 5.

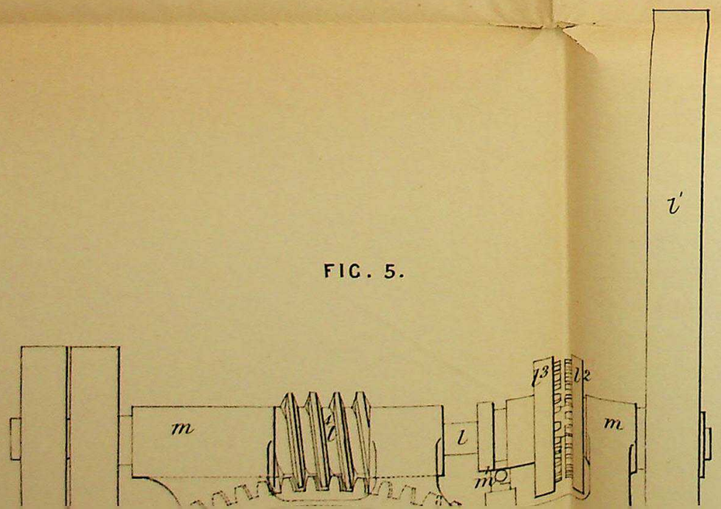


FIG. 6.

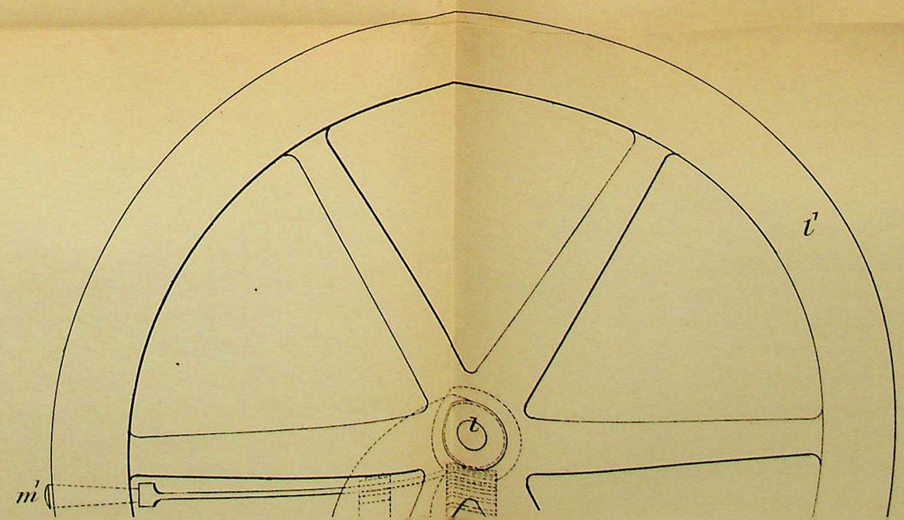


FIG. 2.

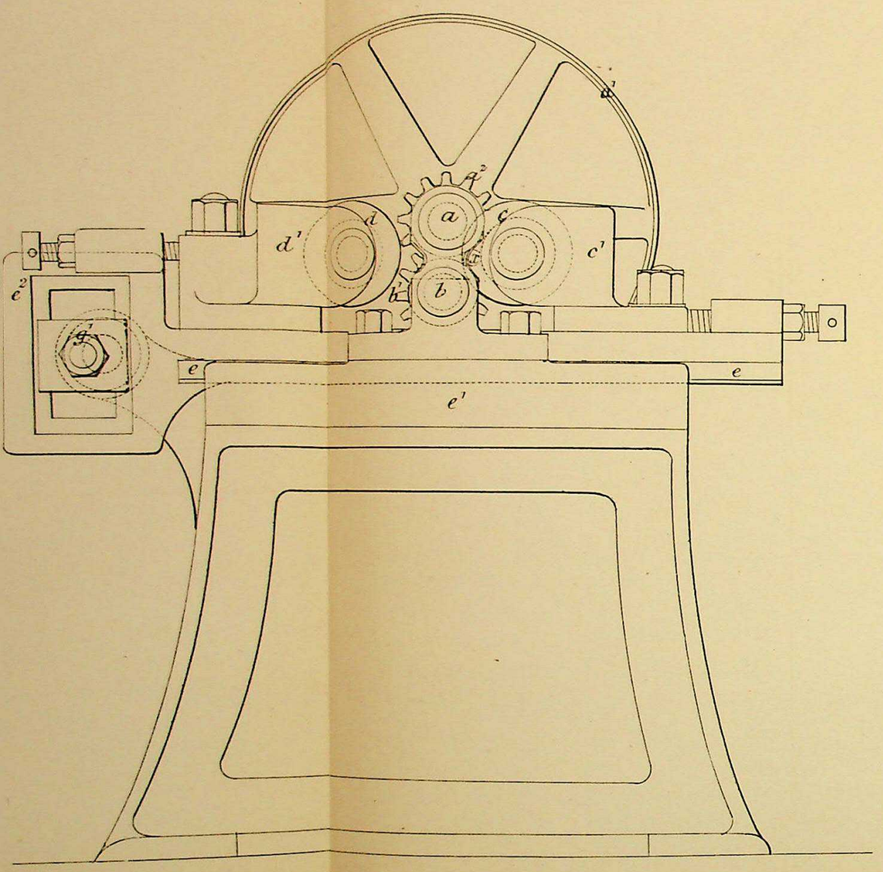
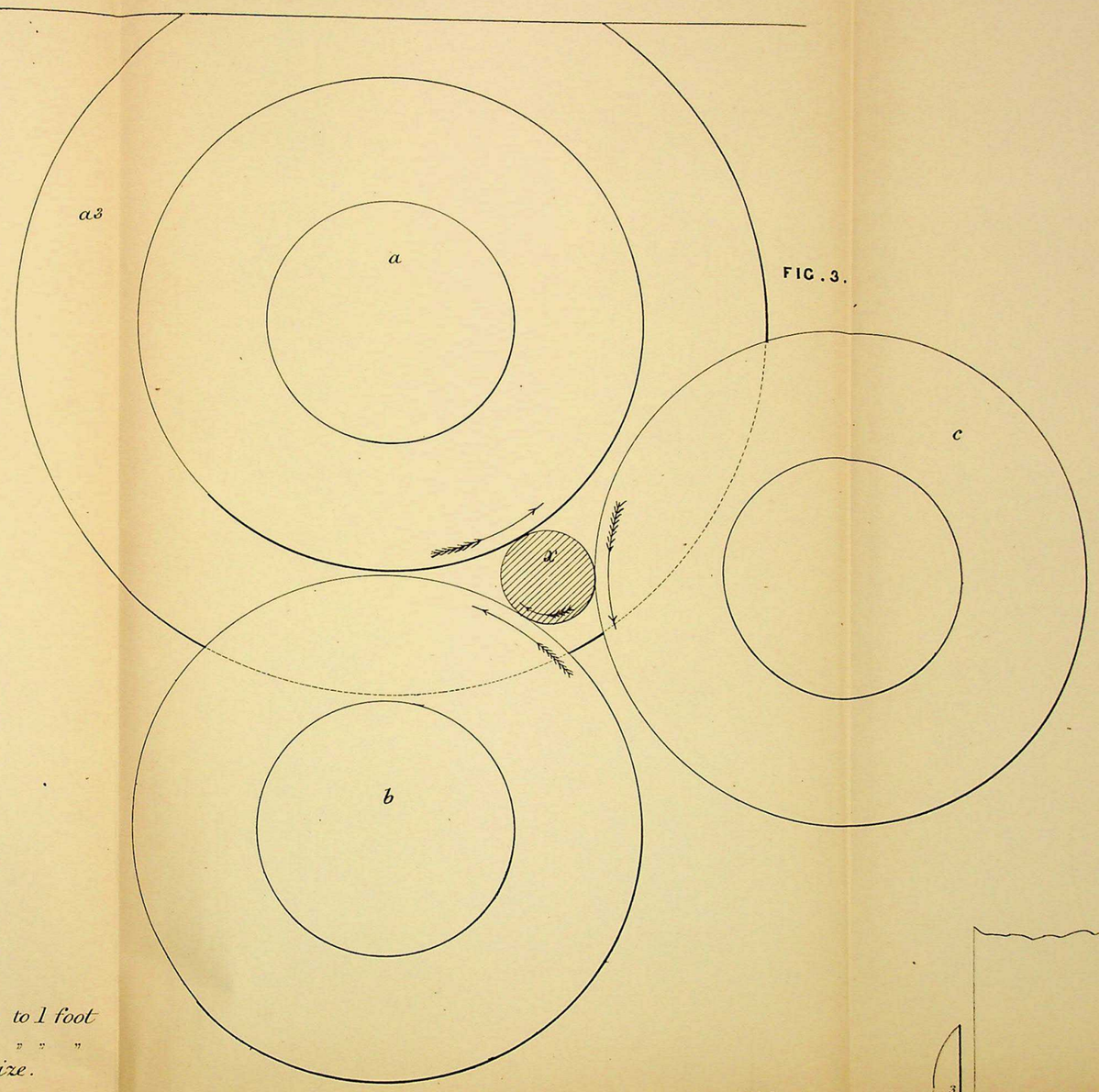


FIG. 3.



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Figs. 3, 4, 9, 10, 11 & 12. Full size.

FIG. 6.

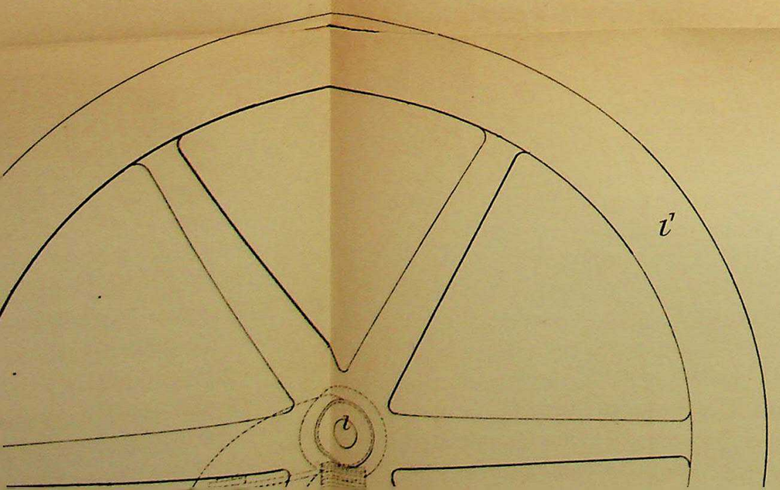
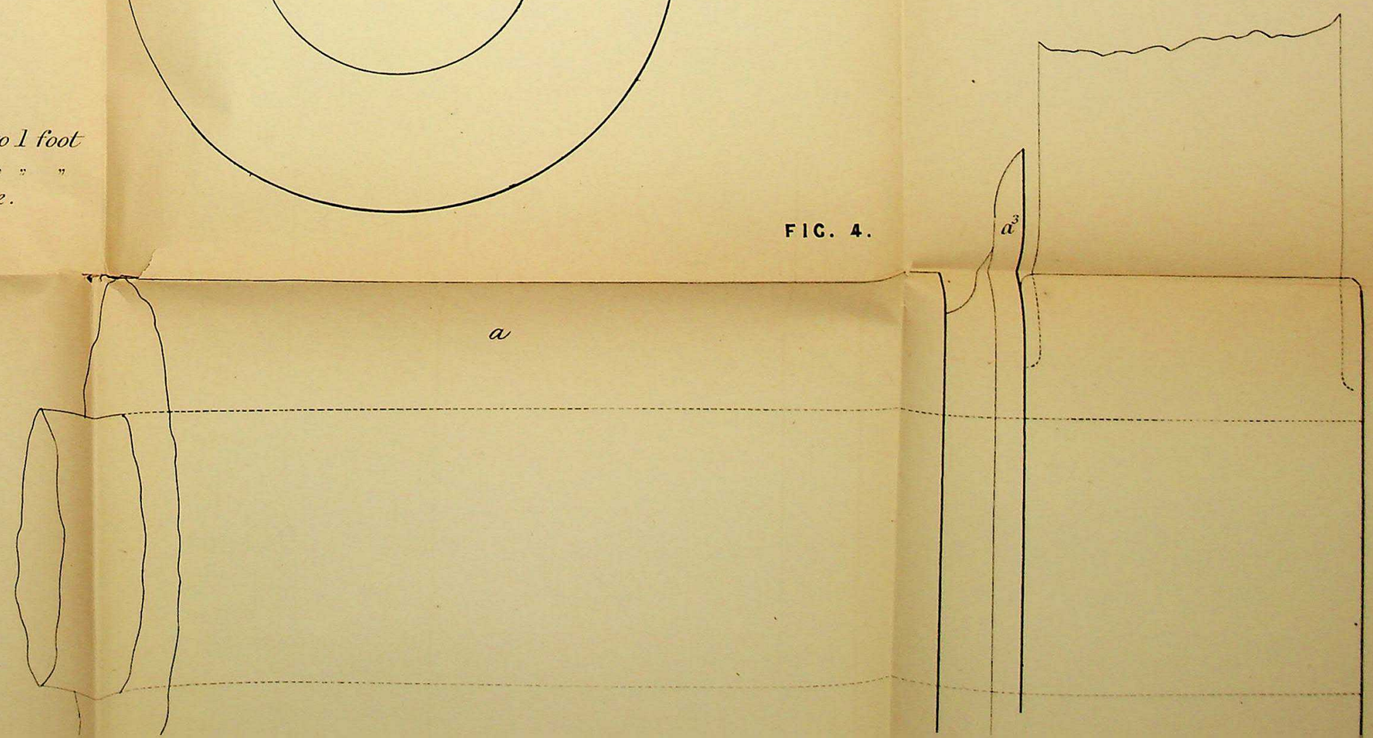
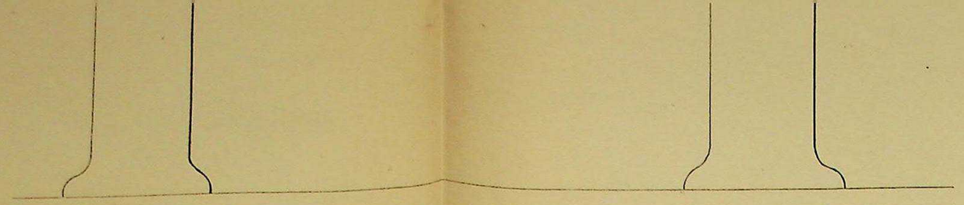


FIG. 4.





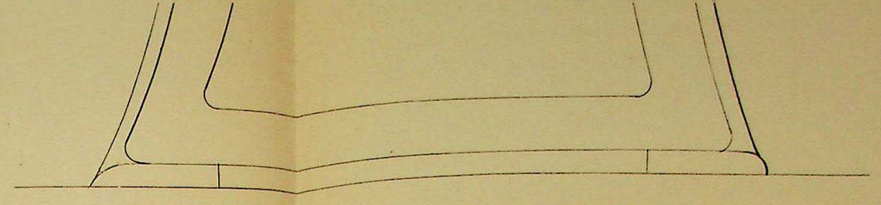


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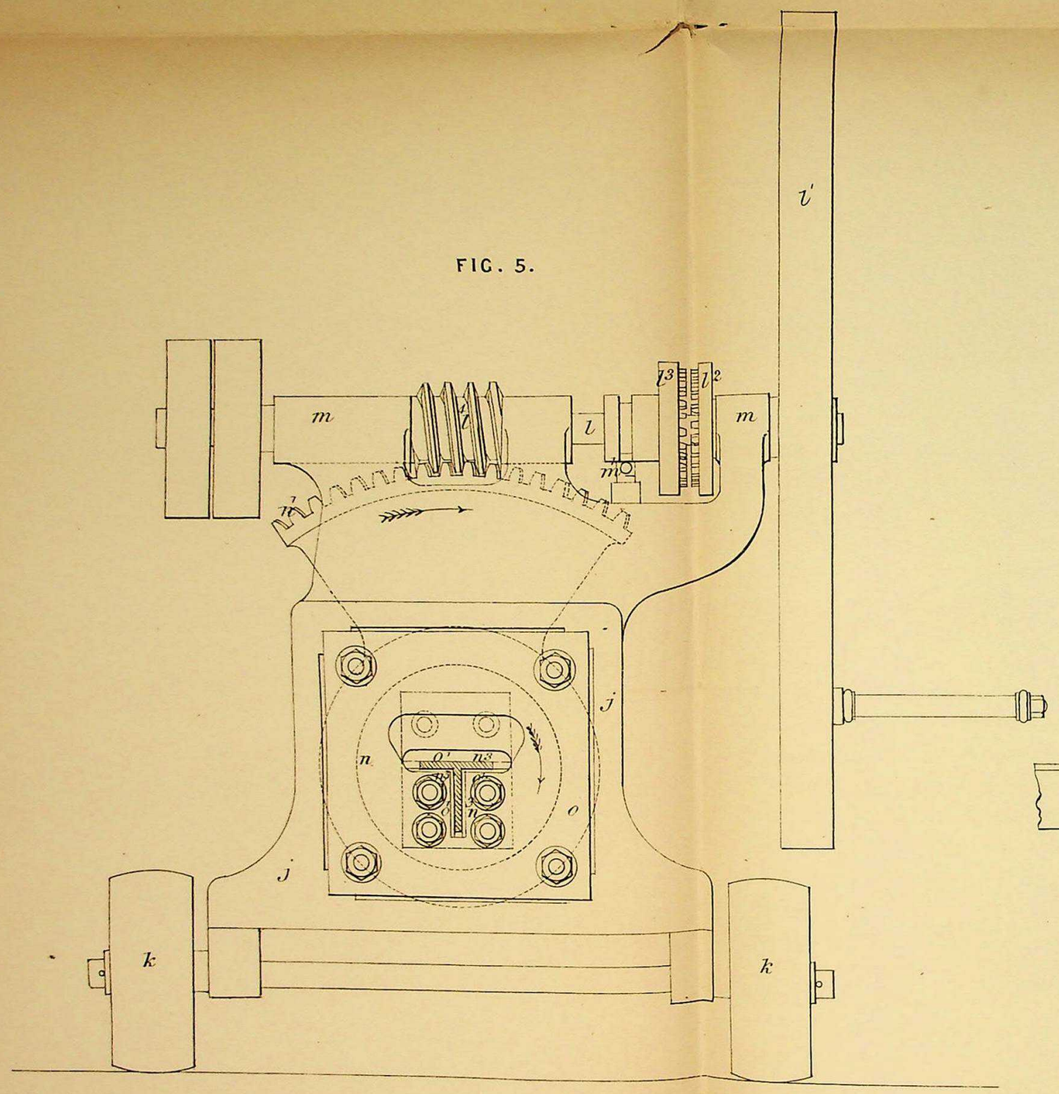
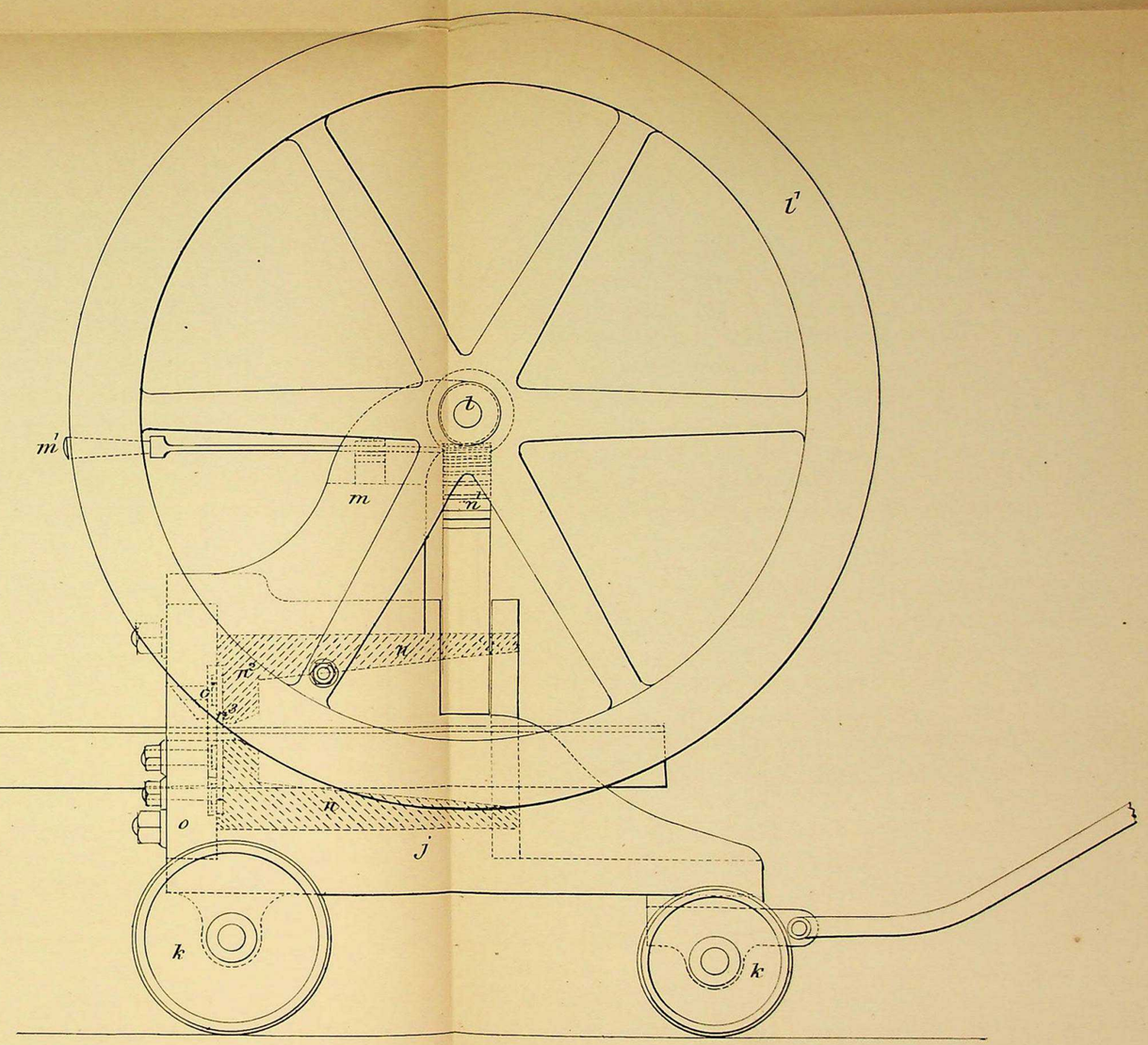
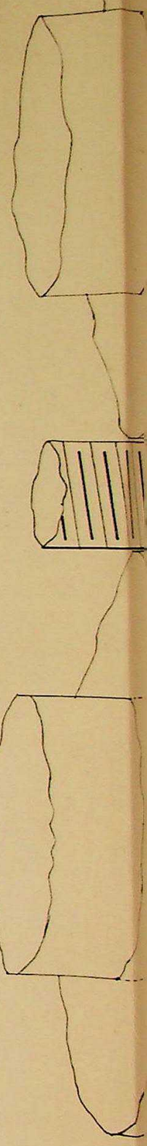
FIG. 6.

FIG. 5.







The filed drawing is not colored.

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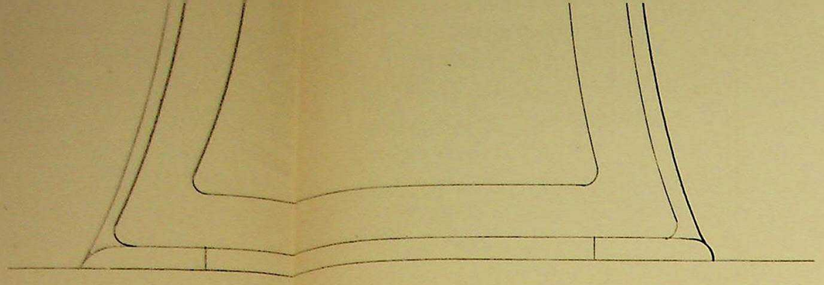

FIG. 6.

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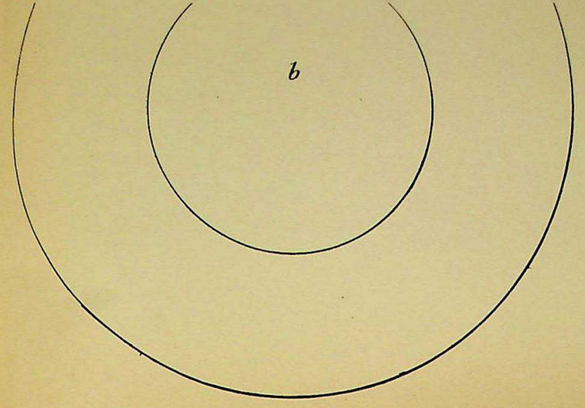

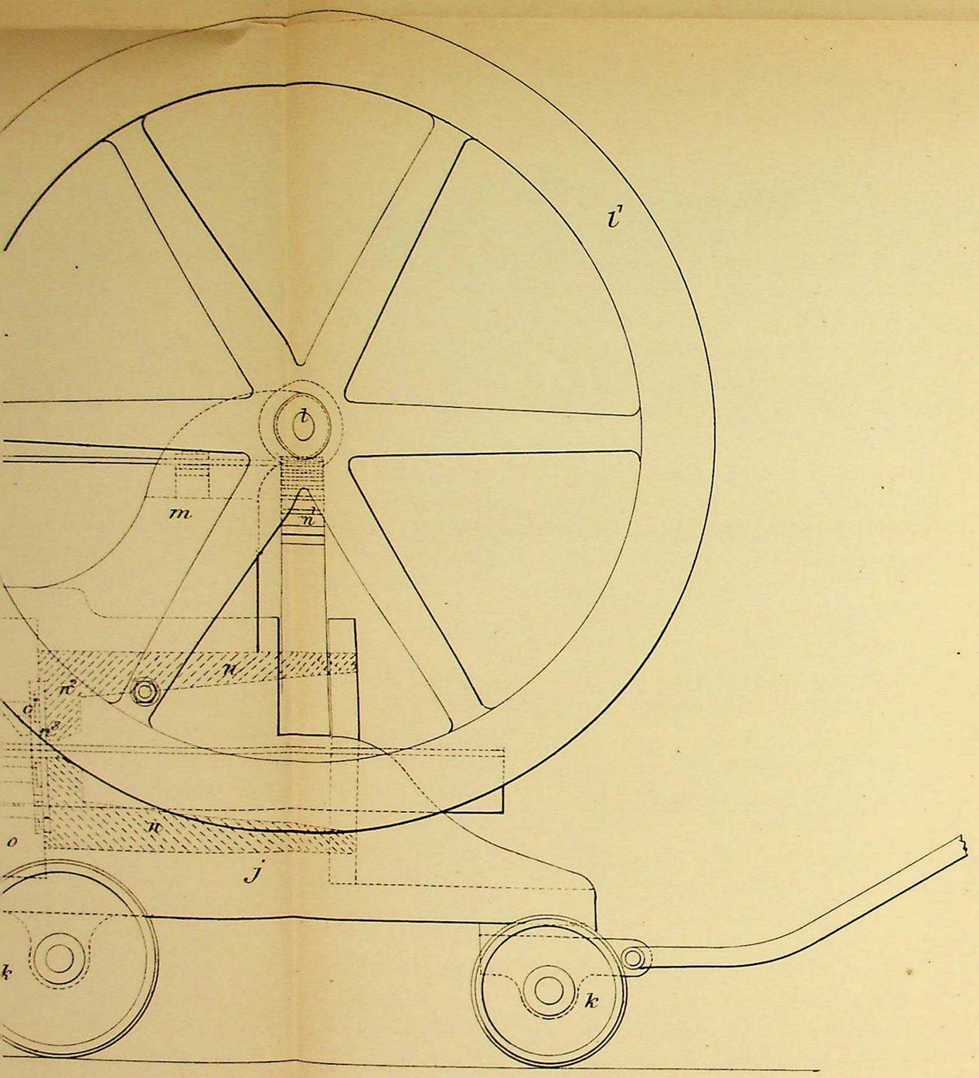

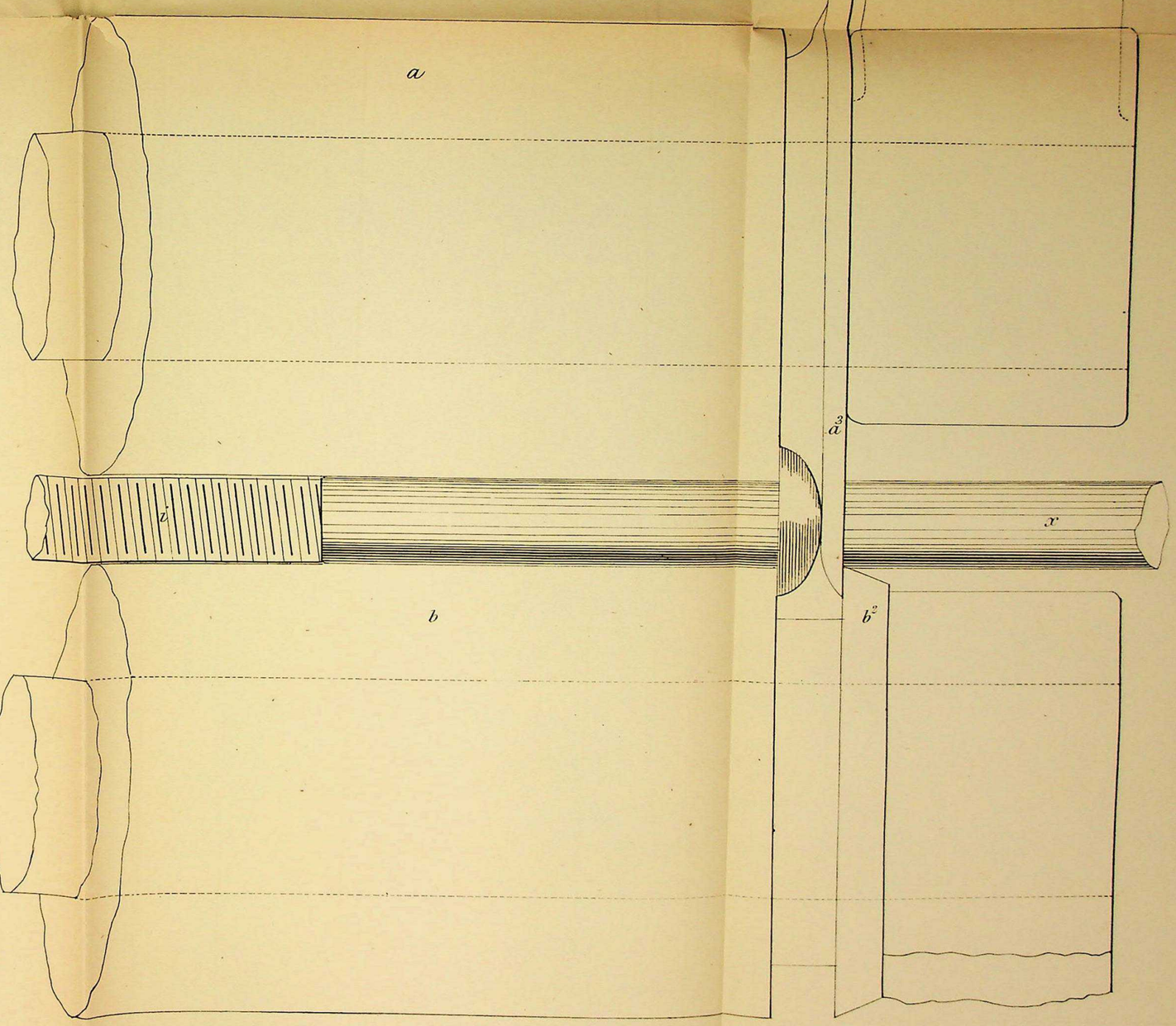

FIG. 4.

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FLETCHER'S Specification.

FIG. 7.

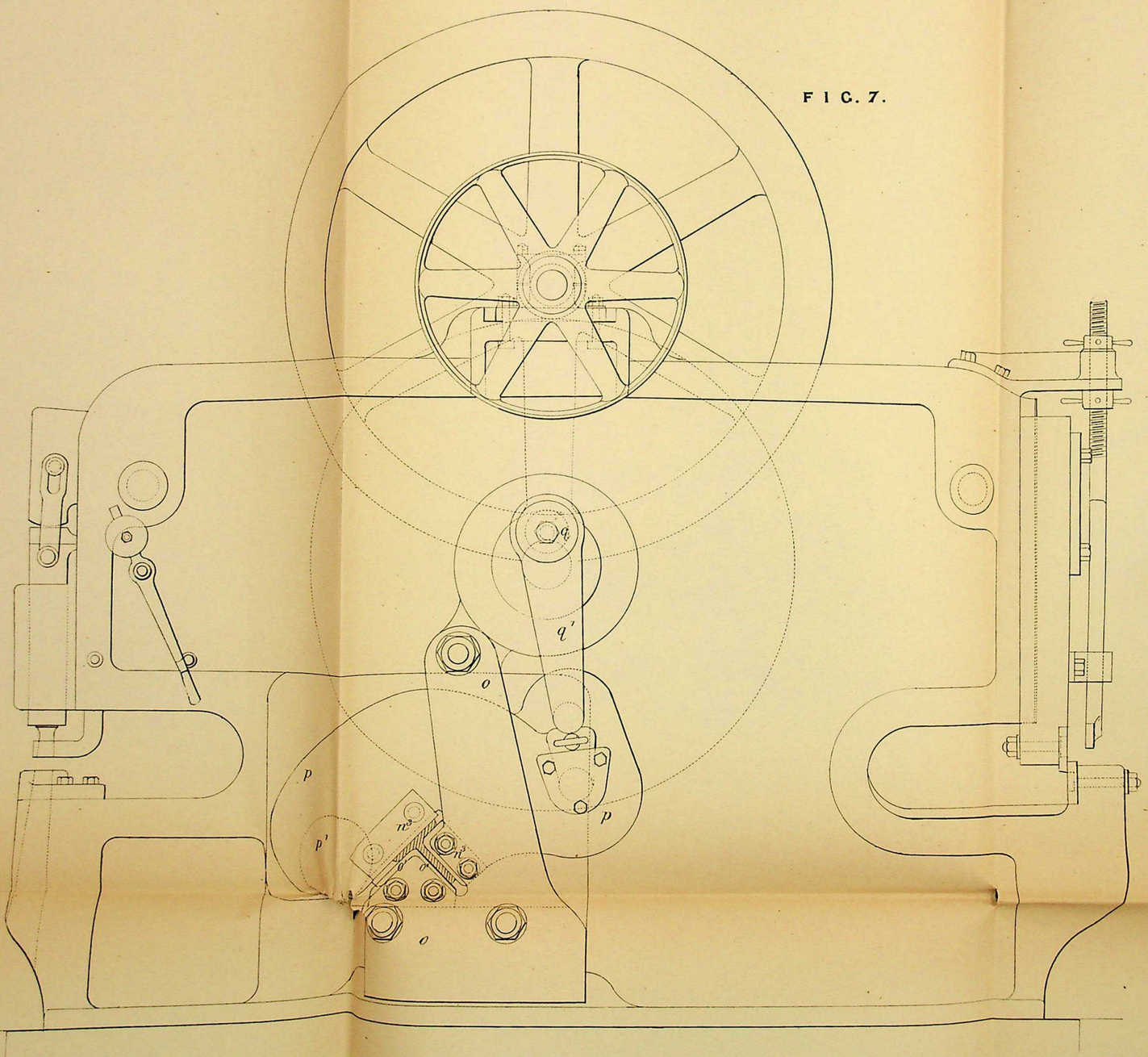


FIG. 9.

FIG. 11.

FIG. 7.

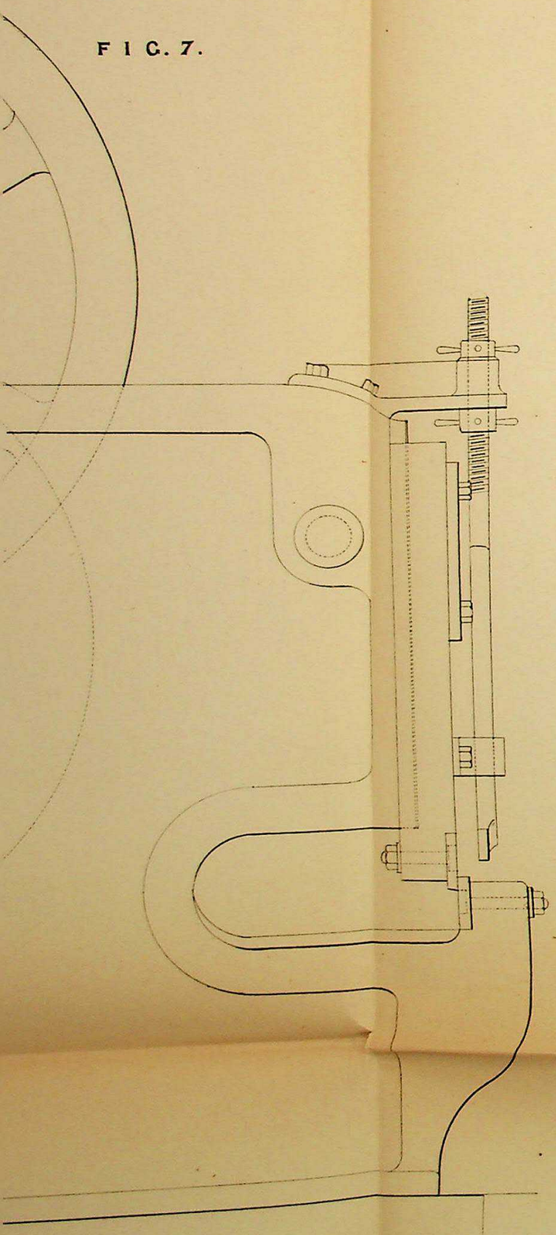


FIG. 8.

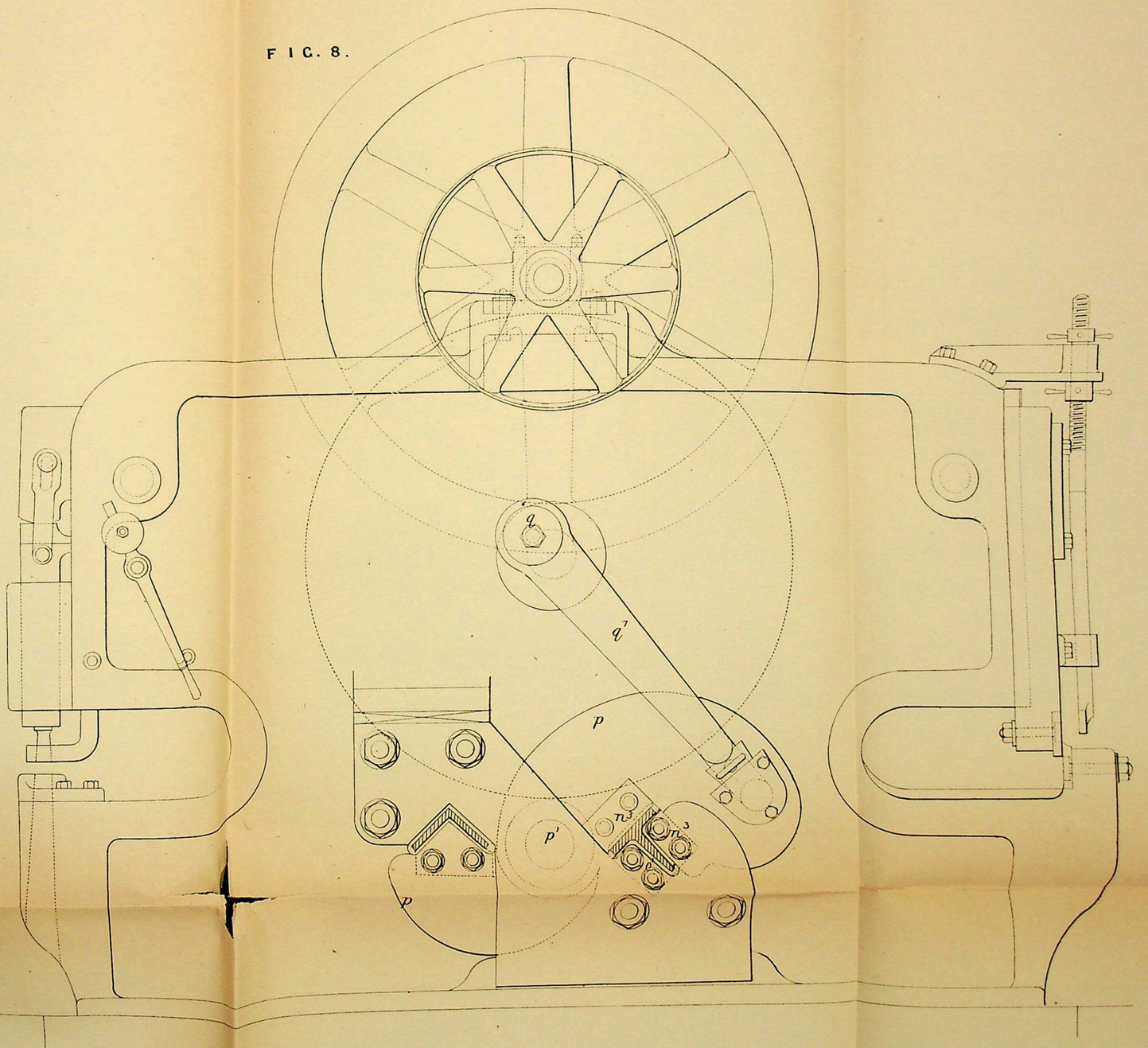
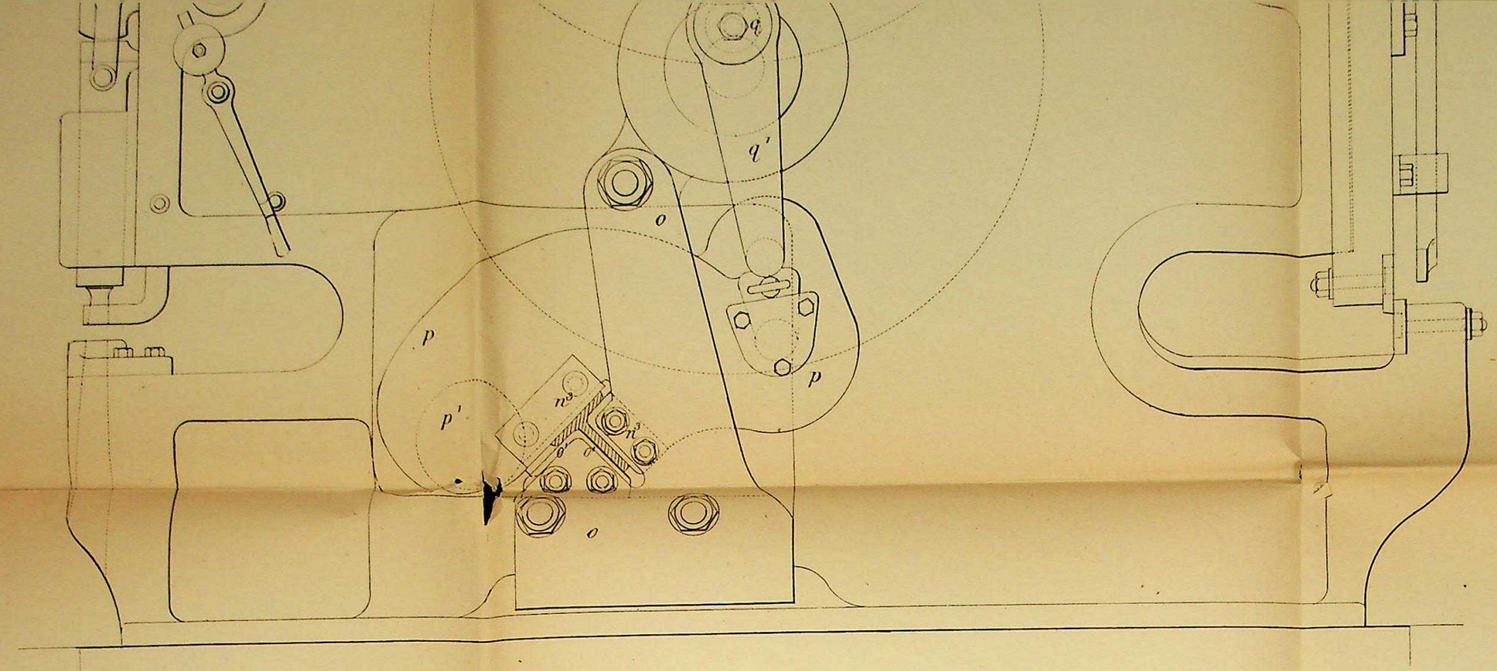


FIG. 10.

FIG. 11.

FIG. 12.



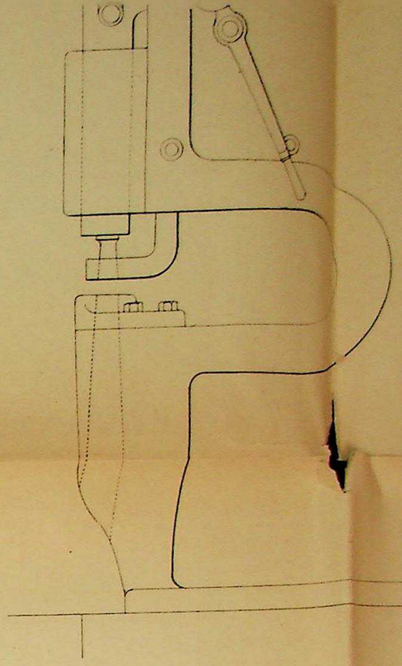


FIG. 9.

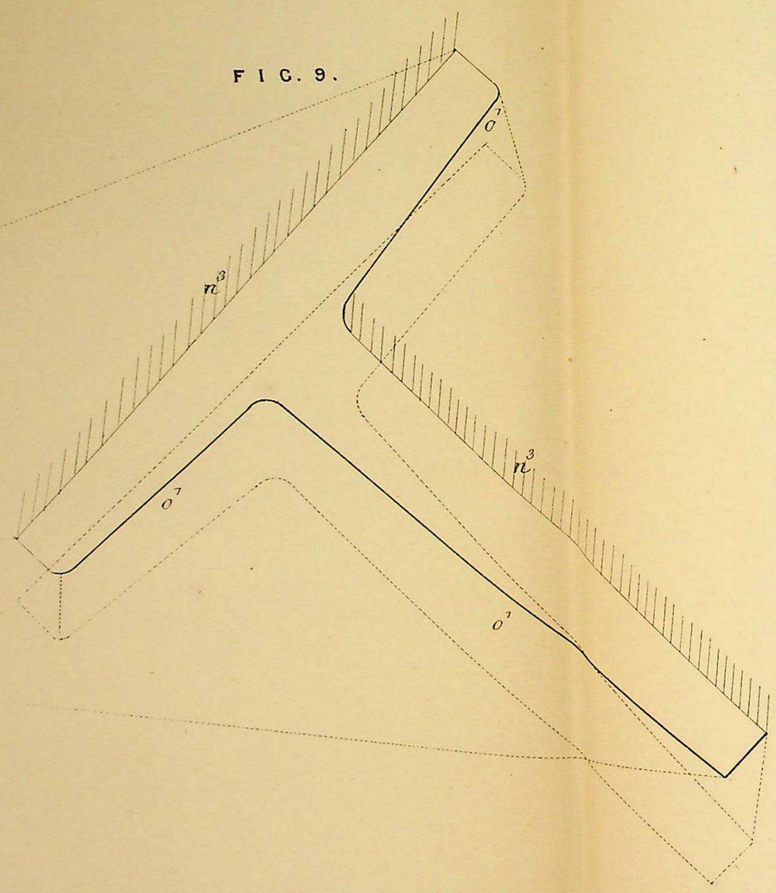


FIG. 10.

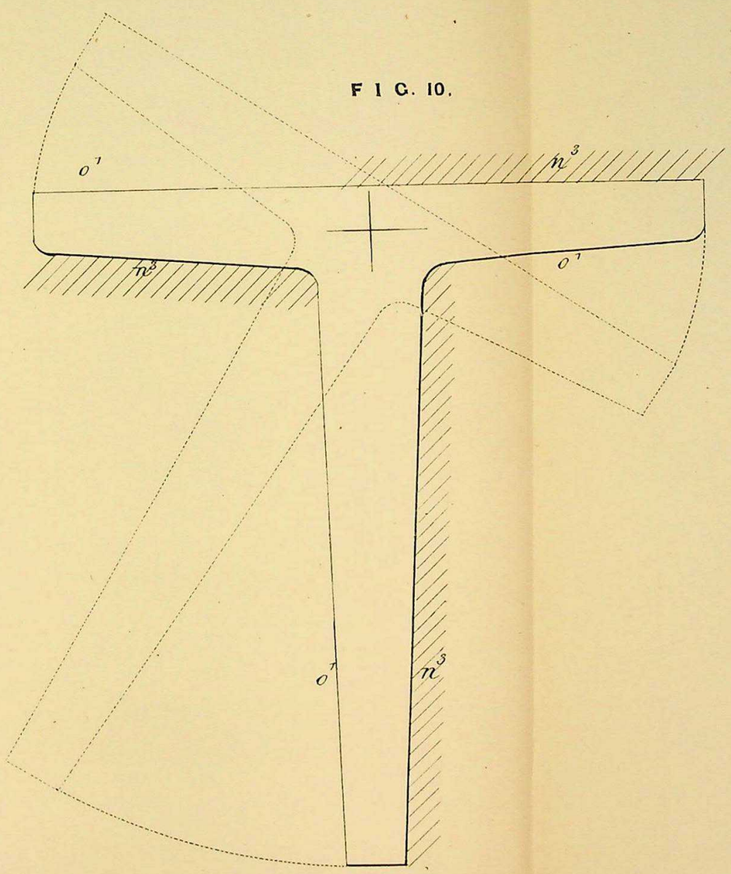
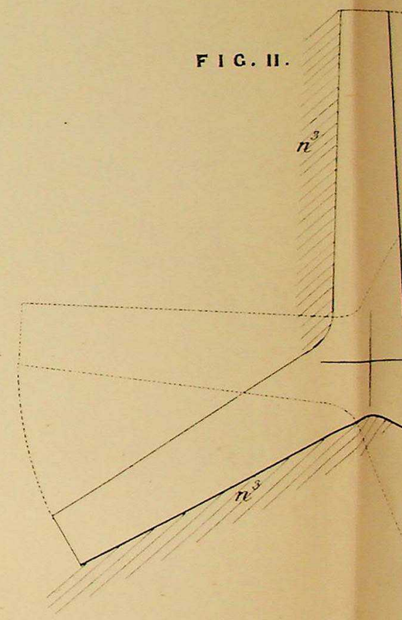


FIG. 11.



The filed drawing is partly colored.

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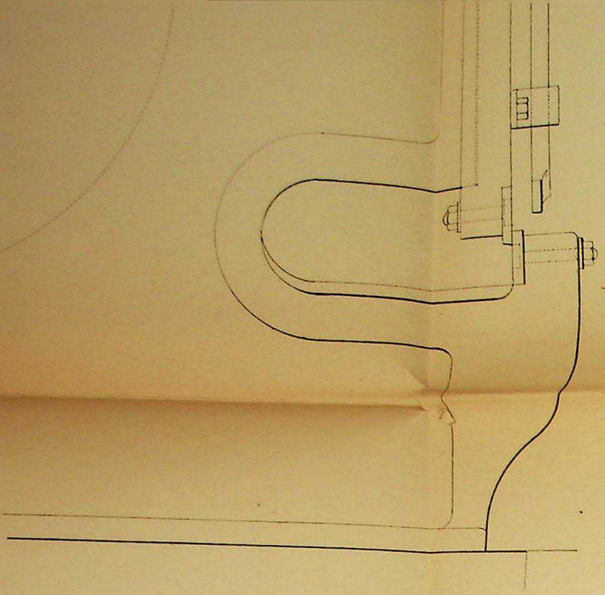
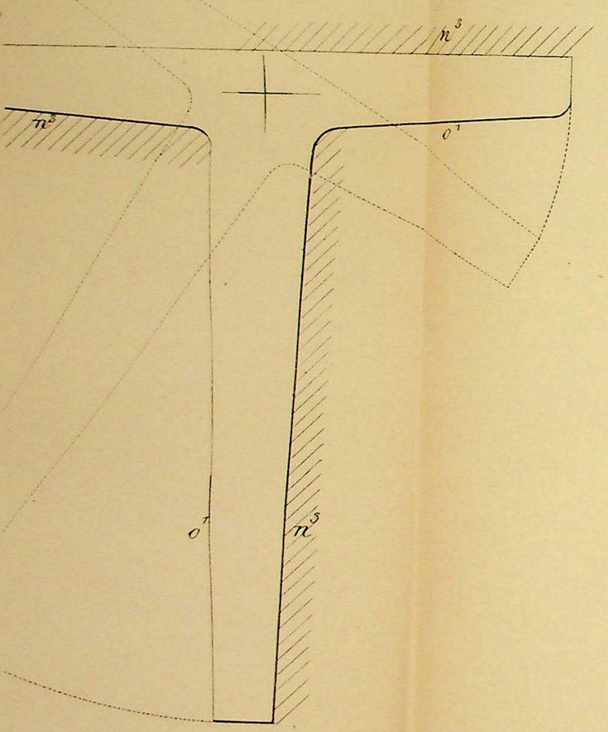


FIG. 10.



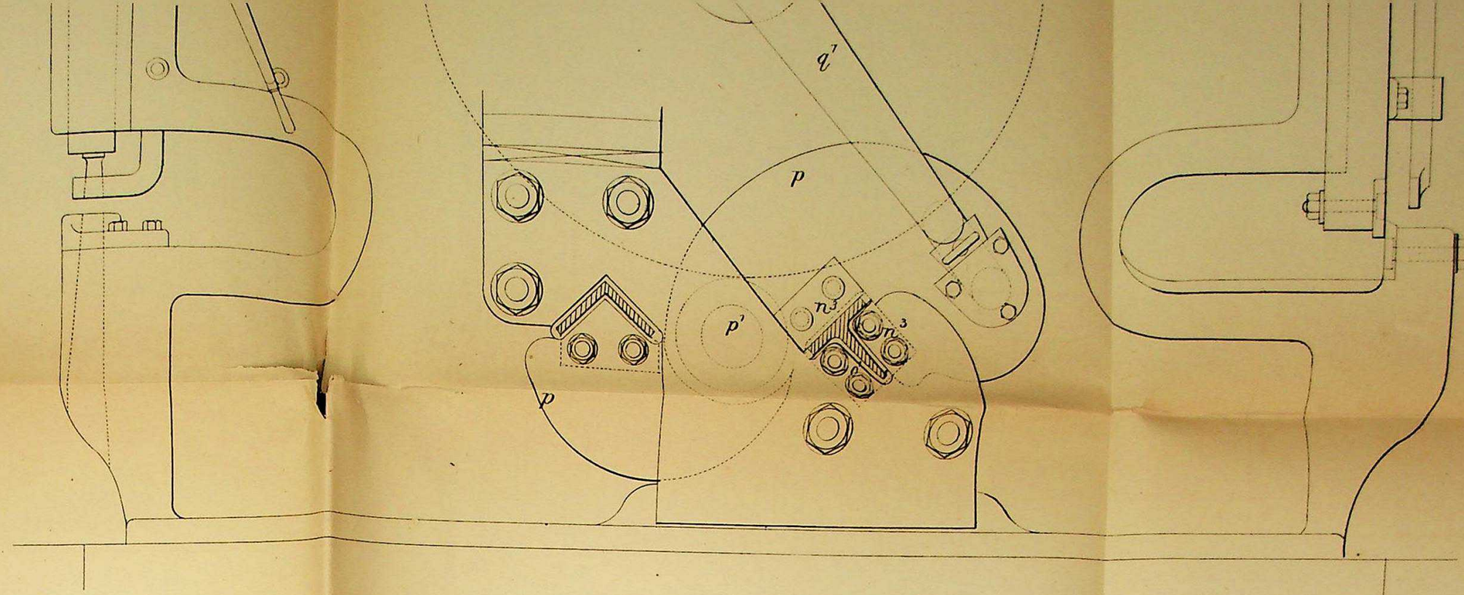


FIG. 11.

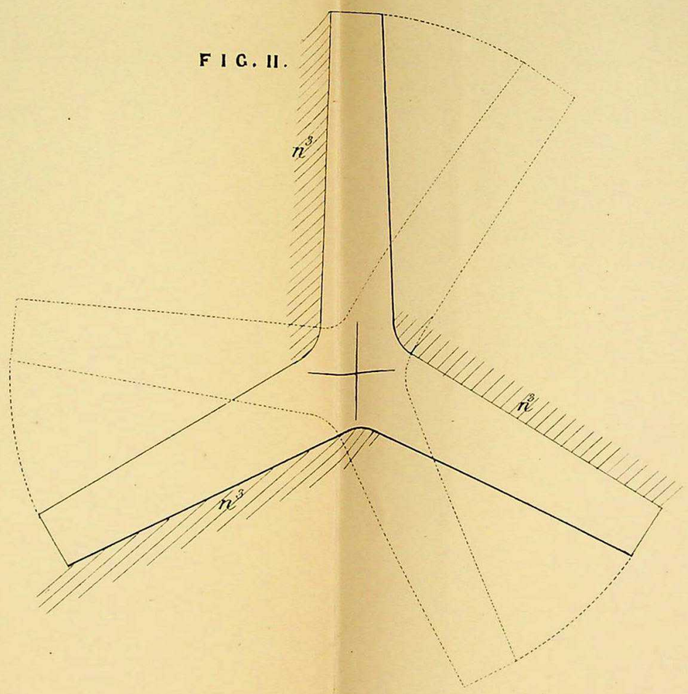
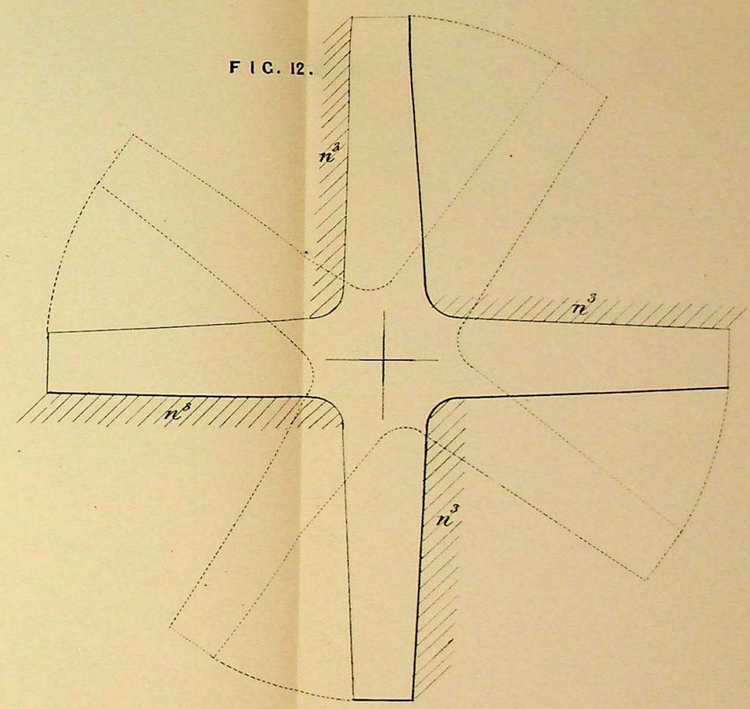


FIG. 12.



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